

Introduction to Equations and Solutions

Name: _____ Date: _____ Score: _____ / 18

Quick Review and Helpful Hints

An *equation* states that two expressions are equal. A *solution* is a value of the variable that makes the equation true. To check whether a number is a solution, substitute it for the variable and see if both sides come out equal.

▷ **Example:** Is $x = 4$ a solution of $3x - 5 = 7$? **Work:** Substitute 4 for x : $3(4) - 5 = 12 - 5 = 7$. The left side equals the right side ($7 = 7$).

★ **Answer:** Yes



A solution makes both sides equal.

Practice Problems

Tell whether the value is a solution (Yes/No), or solve the equation.

- | | |
|---|---|
| 1. Is $x = 3$ a solution of $x + 5 = 8$? _____ | 8. Is $x = 10$ a solution of $x + 3 = 12$? _____ |
| 2. Is $x = 2$ a solution of $4x = 12$? _____ | 9. Solve $x + 6 = 10$ _____ |
| 3. Is $x = 5$ a solution of $2x - 1 = 9$? _____ | 10. Solve $x - 3 = 5$ _____ |
| 4. Is $x = -1$ a solution of $3x + 4 = 1$? _____ | 11. Solve $2x = 14$ _____ |
| 5. Is $x = 6$ a solution of $x - 2 = 3$? _____ | 12. Solve $\frac{x}{3} = 4$ _____ |
| 6. Is $x = 0$ a solution of $5x + 7 = 7$? _____ | 13. Is $x = -2$ a solution of $x^2 = 4$? _____ |
| 7. Is $x = 4$ a solution of $\frac{x}{2} = 2$? _____ | 14. Is $x = 3$ a solution of $2x + 1 = x + 4$? _____ |

Word Problems

15. A number plus 8 equals 15. Write an equation and solve for the number. _____
16. Twice a number is 18. Find the number. _____
17. Maria has \$ x . After earning \$5 she has \$20. Solve $x + 5 = 20$. _____
18. Is $t = 4$ a solution of $3t - 2 = 10$? Check by substituting. _____



Answer Keys

- | | | |
|---------------------------------|---------------------------------------|---------------------------------------|
| 1. <input type="checkbox"/> Yes | 7. <input type="checkbox"/> Yes | 13. <input type="checkbox"/> Yes |
| 2. <input type="checkbox"/> No | 8. <input type="checkbox"/> No | 14. <input type="checkbox"/> Yes |
| 3. <input type="checkbox"/> Yes | 9. <input type="checkbox"/> $x = 4$ | 15. <input type="checkbox"/> $x = 7$ |
| 4. <input type="checkbox"/> Yes | 10. <input type="checkbox"/> $x = 8$ | 16. <input type="checkbox"/> 9 |
| 5. <input type="checkbox"/> No | 11. <input type="checkbox"/> $x = 7$ | 17. <input type="checkbox"/> $x = 15$ |
| 6. <input type="checkbox"/> Yes | 12. <input type="checkbox"/> $x = 12$ | 18. <input type="checkbox"/> Yes |

Step-by-Step Explanations

1. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 3: $3 + 5 = 8$. True, so yes. So the final answer is Yes.
2. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 2: $4(2) = 8$, not 12. So no. So the final answer is No.
3. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 5: $2(5) - 1 = 9$. True, so yes. So the final answer is Yes.
4. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute -1: $3(-1) + 4 = -3 + 4 = 1$. True, so yes. So the final answer is Yes.
5. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 6: $6 - 2 = 4$, not 3. So no. So the final answer is No.
6. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 0: $5(0) + 7 = 7$. True, so yes. So the final answer is Yes.
7. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 4: $\frac{4}{2} = 2$. True, so yes. So the final answer is Yes.
8. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 10: $10 + 3 = 13$, not 12. So no. So the final answer is No.
9. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 6 from both sides: $x = 4$. So the final answer is $x = 4$.
10. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Add 3 to both sides: $x = 8$. So the final answer is $x = 8$.
11. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Divide both sides by 2: $x = 7$. So the final answer is $x = 7$.
12. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply both sides by 3: $x = 12$. So the final answer is $x = 12$.
13. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute -2: $(-2)^2 = 4$. True, so yes. So the final answer is Yes.
14. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 3: left $2(3) + 1 = 7$, right $3 + 4 = 7$. Equal, so yes. So the final answer is Yes.
15. Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The equation is $x + 8 = 15$. Subtract 8: $x = 7$. So the final answer is $x = 7$.
16. Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is The equation is $2x = 18$. Divide by 2: $x = 9$. So the final answer is 9.
17. Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Subtract 5 from both sides: $x = 15$. So the final answer is $x = 15$.
18. A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Substitute 4: $3(4) - 2 = 12 - 2 = 10$. True, so yes. So the final answer is Yes.



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